

Title (en)
Determination of operating limit minimum critical power ratio

Title (de)
Bestimmung des kleinsten kritischen Betriebsgrenzleistungsquotienten

Title (fr)
Détermination du rapport de puissance critique minimum opérationnel

Publication
EP 1221701 A1 20020710 (EN)

Application
EP 01310704 A 20011220

Priority
US 75028900 A 20001229

Abstract (en)
A method and system for thermal-dynamic modeling and performance evaluation of a nuclear Boiling Water Reactor (BWR) core design is presented. A data processing system is used to execute specific program routines that simultaneously simulate the thermal operating characteristics of fuel rods within the reactor during a transient operational condition. The method employs a multi-dimensional approach for the simulation of postulated operational events or an anticipated operational occurrence (AOO) which produces a transient condition in the reactor-such as might be caused by single operator error or equipment malfunction. Based on a generic transient bias and uncertainty in the change in critical power ratio (DELTA CPR/ICPR), histograms of fuel rod critical power ratio (CPR) are generated. Ultimately, the operating limit minimum critical power ratio (OLMCPR) of the reactor is evaluated from a histogram of probability calculations representing the number of fuel rods subject to a boiling transition (NRSBT) during the transient condition. The histogram may be readily displayed by the data processing system and used to statistically demonstrate an OLMCPR compliance of the reactor core design with USNRC regulations.

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G21D 3/04

IPC 8 full level
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G21D 3/001 (2013.01 - EP US); **G21D 3/04** (2013.01 - EP US); **Y02E 30/00** (2013.01 - EP); **Y02E 30/30** (2013.01 - US)

Citation (search report)
• [XD] US 5912933 A 19990615 - SHAUG JAMES C [US], et al
• [A] US 5171516 A 19921215 - IWAMOTO TATSUYA [JP]
• [A] EP 0405863 A2 19910102 - GEN ELECTRIC [US]
• [A] PATENT ABSTRACTS OF JAPAN vol. 014, no. 358 (P - 1087) 2 August 1990 (1990-08-02)

Cited by
US7760842B2; FR2846139A1; EP1508902A3; EP1775732A1; EP1615233A3; CN101939795A; FR2924852A1; EP2077561A1; US9047995B2; US7260512B2; US8149981B2; WO2004038730A1; US8873698B2; US9997263B2; WO2009071817A3; EP1936637A1; JP2008159048A

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